



HUGHES INFORMATION TECHNOLOGY CORPORATION

## **ERRATA NOTICE**

**EOS Core System (ECS) Project**

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**Document No.:** 305-CD-019-001

**Title:** Release A System Monitoring and Coordination Center Design Specification for the ECS Project

The following change pages have been incorporated into the subject document (attached):

3-2 (Figure 3.1.1-1)

3-5 (Internetworking Subsystem)

3-11 (Figure 3.4.2-1)

3-18 (Configuration)

If you have any questions, please contact our Data Management Office at (301) 925-0322.

305-CD-019-001

## **EOSDIS Core System Project**

# **Release A System Monitoring and Coordination Center Design Specification for the ECS Project**

July 1995

Hughes Information Technology Corporation  
Landover, Maryland

# **Release A System Monitoring and Coordination Center Design Specification for the ECS Project**

**July 1995**

Prepared Under Contract NAS5-60000  
CDRL Item #046

## **APPROVED BY**

<u>Parag N. Ambardekar /s/</u>	<u>7/28/95</u>
Parag Ambardekar, Release A CCB Chairman	Date
EOSDIS Core System Project	

**Hughes Information Technology Corporation**  
Landover, Maryland

305-CD-019-001

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# Preface

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This document is one of sixteen comprising the detailed design specifications of the SDPS and CSMS subsystem for Release A of the ECS project. A complete list of the design specification documents is given below. Of particular interest are documents number 305-CD-004, which provides an overview of the subsystems and 305-CD-018, the Data Dictionary, for those reviewing the object models in detail. A Release A SDPS and CSMS CDR Review Guide (510-TP-002) is also available.

The SDPS and CSMS subsystem design specification documents for Release A of the ECS Project include:

305-CD-004	Release A Overview of the SDPS and CSMS Segment System Design Specification
305-CD-005	Release A SDPS Client Subsystem Design Specification
305-CD-006	Release A SDPS Interoperability Subsystem Design Specification
305-CD-007	Release A SDPS Data Management Subsystem Design Specification
305-CD-008	Release A SDPS Data Server Subsystem Design Specification
305-CD-009	Release A SDPS Ingest Subsystem Design Specification
305-CD-010	Release A SDPS Planning Subsystem Design Specification
305-CD-011	Release A SDPS Data Processing Subsystem Design Specification
305-CD-012	Release A CSMS Segment Communications Subsystem Design Specification
305-CD-013	Release A CSMS Segment Systems Management Subsystem Design Specification
305-CD-014	Release A GSFC Distributed Active Archive Center Design Specification
305-CD-015	Release A LaRC Distributed Active Archive Center Design Specification
305-CD-016	Release A MSFC Distributed Active Archive Center Design Specification
305-CD-017	Release A EROS Data Center Distributed Active Archive Center Design Specification
305-CD-018	Release A Data Dictionary for Subsystem Design Specification
305-CD-019	Release A System Monitoring and Coordination Center Design Specification

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This document is a contract deliverable with an approval code 2. As such, it does not require formal Government approval, however, the Government reserves the right to request changes within 45 days of the initial submittal. Once approved, contractor changes to this document are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by Document Change Notice (DCN) or by complete revision.

Any questions should be addressed to:

Data Management Office  
The ECS Project Office  
Hughes Information Technology Corporation  
1616 McCormick Drive  
Landover, MD 20785

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# Abstract

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The Release A System Monitoring and Coordination Center (SMC) Design Specification document describes the implemented design of the ECS SMC, located at the Goddard Space Flight Center, in Greenbelt, Maryland. The purpose of this document is to describe the unique configuration of common ECS software and hardware elements that are configured to support the SMC mission. The SMC provides coordination/distribution of ECS policy, provides user registration and application toolkit information, and provides overall health, performance, fault, and security status of the ECS by exchanging system management summary data from the ECS DAACs and networks. Each of the ECS software and hardware components which compose the SMC is fully documented in its own subsystem design specification document. Therefore this document's focus is on the specific software and hardware components of the SMC as deployed in the Release A timeframe.

**Keywords:** SMC, MSS, CSS, EMC, GSFC, system, management, bulletin, board

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## **Abbreviations and Acronyms**

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# 1. Introduction

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## 1.1 Identification

This Release A SMC Design Specification for the ECS Project, Contract Data Requirement List (CDRL) Item 046, with requirements specified in Data Item Description (DID) 305/DV2, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract NAS5-60000.

## 1.2 Scope

ECS Release A supports the early operational stages of the Tropical Rainfall Measuring Mission (TRMM). The TRMM Release follows an earlier ECS delivery, referred to as Interim Release 1 (IR-1), which provided a limited enterprise infrastructure in preparation for down stream deliveries. The infrastructure delivery of ECS, involves four Distributed Active Archive Centers, these being the Goddard Space Flight Center (GSFC), the Marshall Space Flight Center (MSFC), the Langley Research Center (LaRC), and the EROS Data Center (EDC), and the System Monitoring and Coordination Center (SMC), co-located with the DAAC at GSFC. Even though, only three of the DAACs (GSFC, MSFC and LaRC) directly support the TRMM effort all four are updated to the TRMM level at Release A to simplify configuration management effort and to allow for interface testing at future ECS releases. For Release A, the IR-1 configurations of GSFC, MSFC and LaRC are updated with major hardware and software deliveries while EDC, which is not part of TRMM operations, receives a minor update to support interface testing.

This document is one in a series of documents comprising the Science and Communications Development Office design specification for the Communications and System Management Segment (CSMS) and the Science and Data Processing Segment (SDPS) for ECS Release A. Other documents in the series include an overview, a design specification document for each subsystem and a design implementation specification for each DAAC at Release A.

This document specifically focuses on the SMC configuration and capabilities at Release A. It is released in support of the Release A Critical Design Review.

This document reflects the June 21, 1995 Technical Baseline maintained by the contractor configuration control board in accordance with ECS Technical Direction No. 11, dated December 6, 1994.

### **1.3 Purpose**

The Release A SMC Design Specification establishes the SMC configuration and capabilities at Release A. These capabilities are designed and implemented by the Communications and Systems Management Segment (CSMS). The Release A version of CSMS will provide the hardware, software, and operations to:

- Provide ECS enterprise management functionality
- Provide ECS enterprise communications functionality
- Provide ECS bulletin board services

The purpose of this document is to present the elements of the Release A SMC. The Release A Overview of SDPS and CSMS (305-CD-004-001) provides an overview of the ECS subsystems and should be used by the reader to gain a basic understanding of common ECS design components. The Release Plan Content Description document (222-TP-003-005) provides a detailed mapping of functional capabilities and services that will be available for each release.

### **1.4 Status and Schedule**

This submittal of DID 305/DV2 meets the milestone specified in the Contract Data Requirements List (CDRL) for Critical Design Review (pre-CDR) of NASA Contract NAS5-60000. The submittal will be reviewed during the Release A (CDR) and changes to the design which resulted from that review will be reflected in subsequent updates. The CDR may trigger follow-up actions in response to Review Item Discrepancies (RID) the results of which will be incorporated into the Test Readiness Review (TRR) version of this document.

### **1.5 Document Organization**

This document is organized to describe the implementation of the SMC at Release A as follows:

Section 1 provides information regarding the identification, scope, purpose, status and schedule, and organization of this document.

Section 2 provides a listing of the related documents which were used as source information for this document.

Section 3 provides a description of the SMC implementation. It includes a description of the SMC external interfaces, software implementation, including identification of Commercial-Off-the-Shelf (COTS) products, hardware and networks configuration and operational activities.

- Subsection 3.1 establishes the context for the technical discussions with an overview of the specific SMC mission and operations. It identifies the key ECS related mission and operations activities that are supported at Release A.
- Subsection 3.2 addresses the SMC external interfaces. Major interfaces in the Release A timeframe include EBnet, the ECS DAACs, at GSFC, LaRC, MSFC, and the EDC.

- Subsection 3.3 provides a software component analysis. The SMC is composed of 3 ECS subsystems, the Management Subsystem (MSS), the Communications Subsystem (CSS), and the Internetworking Subsystem (ISS). Each contains Hardware Configuration Items (HWCI) and the MSS and CSS contain Software Computer Software Configuration Items (CSCI). This section addresses the CSCI and their corresponding lower level Computer Software Components (CSC). The CSCs are described in detail in their respective subsystem design specification documents. In this section, the CSCs are captured in a single table, broken down by Subsystem/CSCI. The table lists the CSCI and the associated CSCs. Notes are provided to expand upon generic explanations from the body of the Subsystem Design Specifications to describe what makes the particular CSC specific to the SMC. In addition, when a CSC is identified as Off-the-shelf (OTS), the candidate product is identified.
- Subsection 3.4 describes the ECS Hardware Configuration Items (HWCI) used in the SMC design. This section identifies the specific HWCI components and quantities provided with the SMC at Release A. It includes the Local Area Network (LAN) configuration and the rationale for the specific hardware configuration.
- Subsection 3.5 provides a software to hardware configuration mapping.

Section 4 gives a description of what can be expected in the next version of this document which is planned for each subsequent Release of ECS.

An Abbreviations and Acronyms list containing an alphabetized list of the definitions for abbreviations and acronyms used in this document is also provided.

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## 2. Related Documentation

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### 2.1 Parent Documents

The parent documents are the documents from which the scope and content of this Release A Implementation Specification is derived.

194-207-SE1-001	System Design Specification for the ECS Project
305-CD-002-002	Science Data Processing Segment (SDPS) Design Specification for the ECS Project
305-CD-003-002	Communications and System Management Segment (CSMS) Design Specification for the ECS Project
305-CD-004-001	Release A Overview of the SDPS and CSMS System Design Specification for the ECS Project
305-CD-012-001	Release A CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-013-001	Release A CSMS Systems Management Subsystem Design Specification for the ECS Project
305-CD-018-001	Release A Data Dictionary for Subsystem Design Specification for the ECS Project

### 2.2 Applicable Documents

The following documents are referenced within this Specification, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

206-CD-001-002	Version 0 Analysis Report for the ECS Project
209-CD-001-001	Interface Control Document Between EOSDIS Core System (ECS) and the NASA Science Internet
209-CD-008-002	Interface Control Document Between EOSDIS Core System (ECS) and the Goddard Space Flight Center (GSFC) Distributed Active Archive Center (DAAC)
209-CD-009-002	Interface Control Document Between EOSDIS Core System (ECS) and the Marshall Space Flight Center (MSFC) Distributed Active Archive Center (DAAC)

209-CD-010-001	Interface Control Document Between EOSDIS Core System (ECS) and the Langley Research Center (LaRC) Distributed Active Archive Center (DAAC)
209-CD-011-002	Interface Control Document Between EOSDIS Core System (ECS) and the Version 0 System
304-CD-002-002	Science Data Processing Segment (SDPS) Requirements Specification for the ECS Project
304-CD-002-002	Communications and System Management Segment (CSMS) Requirements Specification for the ECS Project
305-CD-003-002	Communications and System Management Segment (CSMS) Design Specification for the ECS Project
305-CD-014-001	Release A GSFC DAAC Implementation/Design Specification for the ECS Project
305-CD-015-001	Release A LaRC DAAC Implementation/Design Specification for the ECS Project
305-CD-016-001	Release A MSFC DAAC Implementation/Design Specification for the ECS Project
305-CD-017-001	Release A EROS Data Center DAAC Implementation/Design Specification for the ECS Project
313-CD-004-001	Release A CSMS/SDPS Internal Interface Control Document
604-CD-001-004	Operations Concept for the ECS Project: Part 1-- ECS Overview
604-CD-003-001	ECS Operations Concept for the ECS Project: Part 2A -- ECS Release A
210-TP-001-003	Technical Baseline for ECS Project
222-TP-003-006	Release Plan Content Description for the ECS Project
423-41-03	Goddard Space Flight Center, EOSDIS Core System (ECS) Contract Data Requirements Document

### **2.3 Information Documents Not Referenced**

The following documents, although not referenced herein and/or not directly applicable, do amplify and clarify the information presented in this document. These documents are not binding on the content of this Implementation Specification.

333-CD-003-001	SDP Toolkit Users Guide for the ECS Project
194-302-DV2-001	ECS Facilities Plan for the ECS Project
101-303-DV1-001	Individual Facility Requirements for the ECS Project

601-CD-001-002	Maintenance and Operations Management Plan for the ECS Project
608-CD-001-002	ECS Operations Plan for Release B
101-620-OP2-001	List of Recommended Maintenance Equipment for the ECS Project
193-801-SD4-001	PGS Toolkit Requirements Specification for the ECS Project
828-RD-001-002	Government Furnished Property for the ECS Project
430-TP-001-001	SDP Toolkit Implementation with Pathfinder SSM/I Precipitation Rate Algorithm, Technical Paper
440-TP-001-001	Science Data Server Architecture Study [for the ECS Project]
420-TD-001-001	ECS Data Server Taxonomy Technical Description [for the ECS Project]
423-16-01	Goddard Space Flight Center, Data Production Software and Science Computing Facility (SCF) Standards and Guidelines
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System
540-022	Goddard Space Flight Center, Earth Observing System (EOS) Communications (Ecom) System Design Specification
560-EDOS-0211.0001	Goddard Space Flight Center, Interface Requirements Document Between EDOS and the EOS Ground System (EGS)

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## 3. SMC Configuration

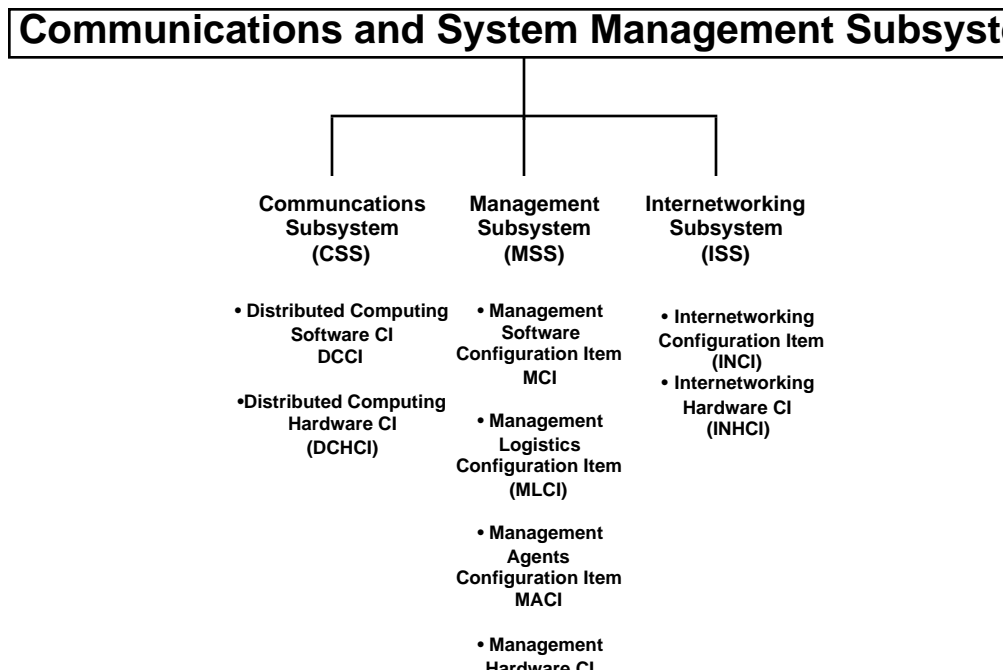
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### 3.1 Introduction

#### 3.1.1 SMC Overview

The System Monitoring and Coordination Center (SMC) is a part of NASA's Earth Observing System Data and Information System (EOSDIS) Core System (ECS). EOSDIS, when fully deployed will consist of nine Distributed Active Archive Centers (DAACs). The SMC's role is to coordinate policy issues amongst the DAACs, provide user registration information, toolkit information and monitor the overall health of the ECS.

The SMC is composed of components of the Systems Management Subsystem, the Communications Subsystem and Internetworking Subsystem. These subsystems are further broken down into hardware and software elements, as illustrated in Figure 3.1.1-1. The bulk of this document focuses on the selected elements of the ECS design that are used to achieve the Release A objectives of the SMC. Section 2.1 of this document identifies ECS CDR Design Specifications which provide detailed information on each subsystem.



**Figure 3.1.1-1. ECS Subsystems and Components of the SMC**

### 3.1.2 SMC Mission and Operations Activities

ECS subsystems provide mission and operations functionality for Release A. Key ECS related mission and operations activities supported by the SMC include:

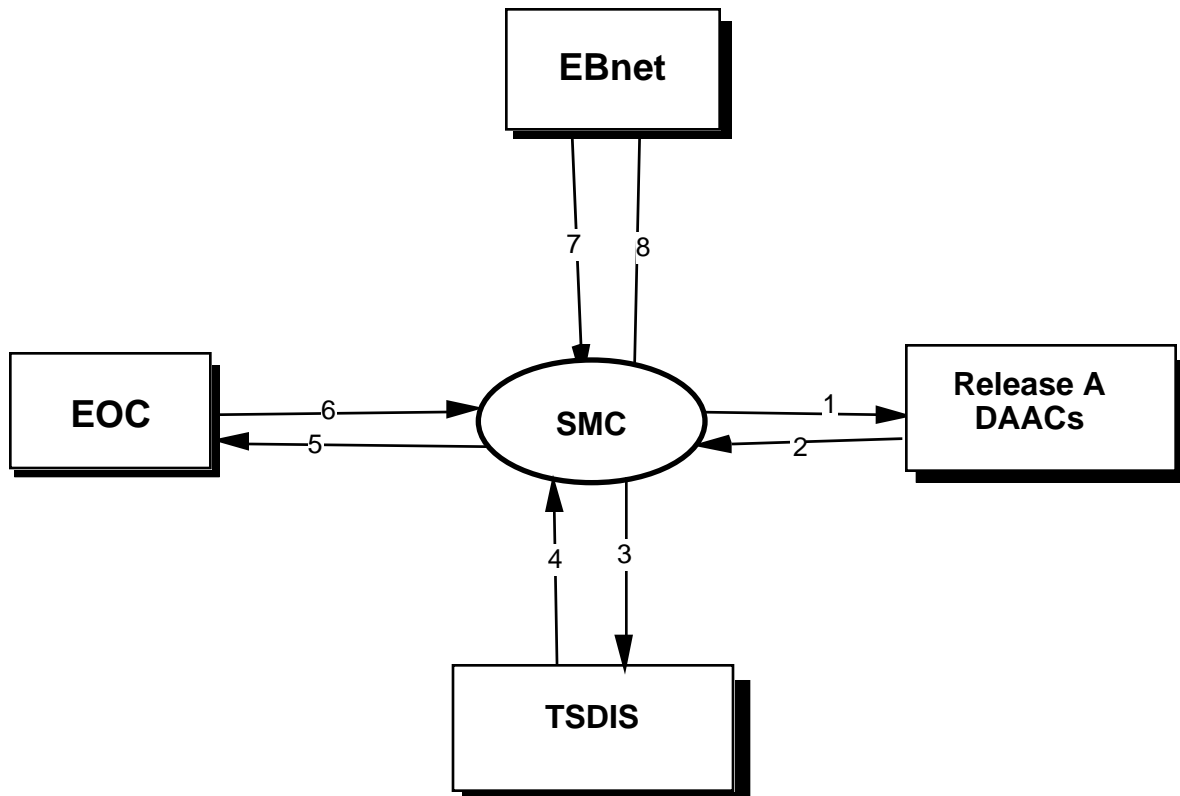
**Table 3.1.2-1. SMC Operations Support Functions**

SMC Operational Roles	ECS Capability
User Registration	Communications Subsystem
System Performance Analysis	Systems Management Subsystem
Security Management Analysis	Systems Management Subsystem
Fault Management Analysis	Systems Management Subsystem
Accountability, Accounting & Billing *	Systems Management Subsystem
Configuration Management	Systems Management Subsystem
ECS Policy Dissemination	Systems Management Subsystem Communication Subsystem

\*Accounting & Billing in Release B

## 3.2 SMC External Interfaces

The SMC will interface with multiple several external organizations and to each ECS DAAC. The ECS subsystem-specific DID305 design documents address the interfaces generically in a series of tables supported by textual explanations. For details, the reader is referred to those documents in addition to the various Interface Control Documents (ICDs). Figure 3.2-1 schematically illustrates the interfaces between the SMC and its external entities (sinks and sources of data). The figure enumerates data flows which are elaborated upon in Table 3.2-1.



**Figure 3.2-1. SMC External Interfaces**

The following further describes the external entities, including those identified to support interface testing:

- Release A DAACs - At Release A, the SMC will interface with the GSFC, MSFC, LaRC, and EDC DAACs. Policy information, originating from the ESDIS project office, system and network performance and management summary data, and user registration data will be exchanged between the SMC and the Local System Management (LSM) element at each DAAC. This information is identified in Table 3-1.

- EOSDIS Backbone Network (EBnet) - The EBnet is the primary interface between the SMC, DAACs, EDOS, other ECS assets, and non-ECS elements. The SMC interface with the EBnet is to monitor and exchange status information between the EBnet and ECS.
- TSDIS - The SMC interface with TSDIS is to monitor the status of the TSDIS. At Release A this interface is via email messages.
- EOC - The SMC interface with EOC, at Release A is via the LSM at the EOC. This interface is used for early testing of the EOC - SMC interface by transfer of status information and performance summary data from the EOC to the SMC.

**Table 3.2-1. SMC External Interfaces**

Flow No.	Source	Destination	Data Types	Data Volume	Frequency
1	SMC	Rel A DAACs (MSS)	Policies	low	as required
1	SMC	Rel A DAACs (MSS)	Conflict Resolution	low	as required
1	SMC	Rel A DAACs (MSS)	Procedures	low	as required
1	SMC	Rel A DAACs (MSS)	Directives	low	as required
2	Rel A DAACs (MSS)	SMC	Conflict Resolution Request	low	as required
2	Rel A DAACs (MSS)	SMC	Status	low	as required
2	Rel A DAACs (MSS)	SMC	Performance	low	as required
3	SMC	TSDIS	Status Request	low	as required (via email)
4	TSDIS	SMC	Status	low	as required (via email)
5	SMC	EBnet	Status Request	low	as required
6	EBnet	SMC	Status, fault and performance	low	as required
7	SMC	EOC (LSM)	Status Request	low	as required
8	EOC (LSM)	SMC	Status	low	as required

## 3.3 Computer Software Component Analysis

### 3.3.1 Software Subsystem Overview

The SMC is composed of three ECS subsystem components, the Management Subsystem, the Communications Subsystem, and the Internetworking Subsystem. Each subsystem is described in detail in their respective subsystem design specification document. This section provides a brief overview description of each of the subsystems found in the SMC.

**Management Subsystem (MSS):** The Management Subsystem (MSS) provides enterprise management (network and system management) of all ECS resources including: COTS hardware (including computers, peripherals, and network routing devices), COTS software, and custom applications. Enterprise management reduces overall development and equipment costs, improves operational robustness, and promotes compatibility with evolving industry and government standards by mandating standard Management Information Base (MIB) definitions, and Management Agents using standard protocols such as SNMP. Consistent with current industry trends, the MSS manages both ECS's network resources per ESN requirements and ECS's host/application resources per SMC requirements. Additionally, MSS also supports many requirements allocated to SDPS and FOS for management data collection, analysis and distribution.

The MSS provides services for both system-wide monitoring (i.e. SMC) and local (i.e. LSM) system and network management support. With few exceptions, the management services will be fully decentralized, thus no single point of failure exists which would preclude unauthorized user access. In principle every service is distributed unless there is an overriding reason for it to be centralized. MSS supports two primary specializations: Enterprise Monitor and Coordination Services and Local System Management Services.

For Release A, a limited set of MSS services will be implemented, using COTS, configured to meet ECS requirements, COTS customization mainly through the use of script files, and custom software, or glue code to bond several COTS packages together. Some of the MSS services will be provided through the use of Office Automation (OA) tools.

**Communications Subsystem (CSS):** The CSS services include Object Services, Distributed Object Framework (DOF) and Common Facility Services. Support in this subsystem area is provided for peer-to-peer, advanced distributed, messaging, management, and event-handling communications facilities. These services typically appear on communicating end-systems across an internetwork and are not layered, but hierarchical in nature. Additionally, services to support communicating entities are provided, included directory, security, time, and other ancillary services. The services of the Communications Subsystem are functionally dependent on the services of the Internetworking Subsystem. The services of the common facility, object and DOF are the fundamental set of interfaces for all CSMS management and FOS and SDPS user access (i.e., pull) domain services. The DOF services are the fundamental set of dependencies of the common facility and object services.

**Internetworking Subsystem (ISS):** The Internetworking Subsystem provides for the transfer of data transparently between end systems within local and wide area networks. The ESN LANs are responsible for transfer of data within the DAACs, SMC and EOC, and for providing interfaces between these components and external networks. ECS interfaces with external systems and DAAC to DAAC communications are provided by the EOSDIS Backbone Network (EBnet). EBnet's primary function is to transfer data between DAACs, including both product data and inter-DAAC queries and metadata responses. Other networks, such as NSI, will provide wide-area services to ECS. In

addition, "Campus" networks, which form the existing networking infrastructure at the ECS locations, will provide connectivity to EOSDIS components such as SCFs and ISTs.

### 3.3.2 Software Subsystem Analysis Summary

The software subsystem analysis summary addresses the CSCIs that compose the SMC. In general, the CSCIs developed for the LSM at each DAAC, provide all the functionality necessary to satisfy the SMC mission at Release A. When differences occur they are due more to things like database content and schema constructs rather than to application software. In the case of COTS packages, the possibility exists where a different version of software such as Unix for example, is required to support the different hardware platforms required from DAAC to DAAC, but even this will be minimal for Release A. The following descriptions serve to highlight specific differences in the SMC implementation of the software subsystems.

- **Communications Subsystem (CSS)** - The CSS provides a number of services in support of the distributed computing architecture designed for the ECS. The SMC uses these services for communication with the DAACs and external systems. The ECS also provides a bulletin board service that supplies users with registration and toolkit information. This bulletin board service is incorporated into the SMC design as a security measure to preclude unauthorized access to ECS resources.
- **Management Subsystem (MSS)** - The MSS is composed of a variety of management applications, providing services such as fault management, performance management, security management and accountability management of ECS networks, hosts, and applications. Two tiers of "view" (domain of management service interface) are provided by the applications in this subsystem. The SMC has both a local management view (of itself) and an enterprise-wide view, of all DAACs.
- **Internetworking Subsystem (ISS)** - The Internetworking Subsystem provides for the transfer of data transparently within the DAACs, SMC and EOC, and for providing interfaces between these components and external networks. ECS interfaces with external systems and DAAC to DAAC communications are provided by the EOSDIS Backbone Network (EBnet). EBnet's primary function is to transfer data between DAACs, including both product data and inter-DAAC queries and metadata responses. Other networks, such as NSI, will provide wide-area services to ECS. In addition, "Campus" networks, which form the existing networking infrastructure at the ECS locations, will provide connectivity to EOSDIS components such as SCFs and ISTs.

Table 3.3-1 lists the ECS subsystems that compose the SMC, and associated CSCIs and CSCs. For each CSC, there is an indication of the component type. As defined in the DID 305 subsystem-specific documents, "*TYPE*" indicates whether the component is custom developed (DEV), off-the-shelf (OTS), a CSC reused from another subsystem (reuse), a wrapper (WRP), or a combination of these types. The Notes column is included to comment about the characteristics of the system, data, and/or software that makes the CSC specific, as well as to provide any additional information about the generic CSCs.

**Table 3.3-1. SMC Component Analysis (1 of 2)**

Subsystem	CSCI	CSC	TYPE	NOTES
Client	WKBCH	CSMS Toolkit CSC	DEV	
CSS	DCCI	Multicast		At EOC(FOS) for Release A , neither at DAACs nor SMC for Release A
CSS	DCCI	File Access Services	OTS/ DEV	native operating system (ftp)
CSS	DCCI	Message Passing Services	DEV	Developed with OODCE
CSS	DCCI	Time Services	OTS/ DEV	OODCE
CSS	DCCI	Event Logger Services	DEV	
CSS	DCCI	Electronic Mail Services	OTS/ DEV	native operating system
CSS	DCCI	Thread Services	OTS	OODCE
CSS	DCCI	Directory/Naming Services	OTS/ DEV	OODCE
CSS	DCCI	Life Cycle Services	OTS/ DEV	OODCE
CSS	DCCI	Security Services	OTS/ DEV	OODCE
CSS	DCCI	DOF Services	OTS	OODCE
CSS	DCCI	Virtual Terminal Services	OTS	native operating system
CSS	DCCI	Bulletin Board Services	OTS	native operating system
ISS	INCI	Datalink/Physical	OTS	firmware, vendor-supplied with hardware
MSS	MCI	Management Framework	OTS/ DEV	HP OpenView Network Node Manager
MSS	MCI	Diagnostic Tests	OTS	vendor-supplied with hardware
MSS	MCI	Application Management	DEV	
MSS	MCI	Automatic Actions	DEV	
MSS	MCI	Resource Class Category	DEV	
MSS	MCI	Performance Manager	OTS/ DEV	not chosen yet
MSS	MCI	Report Generation and Distribution	DEV	
MSS	MCI	Performance Test	OTS	vendor-supplied with hardware
MSS	MCI	Performance Management Proxy	DEV	
MSS	MCI	Security Manager	DEV	

**Table 3.3-1. SMC Component Analysis (2 of 2)**

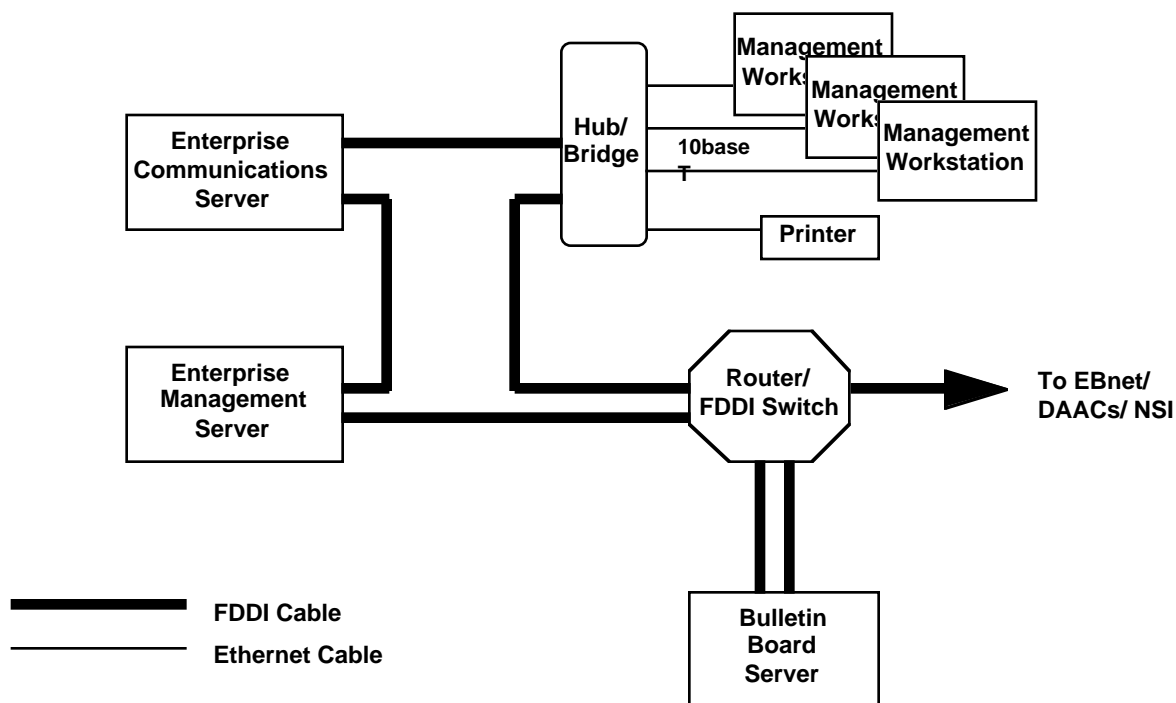
Subsystem	CSCI	CSC	TYPE	NOTES
MSS	MCI	Security Databases	OTS	Operating System Password Files, DCE Registry Database, Router Configuration Files, TCP Wrappers configuration files, Operating System Access Control Lists, DCE Access Control Lists
MSS	MCI	Tests	OTS	CRACK, COPS, SATAN, TRIPWIRE
MSS	MCI	DCE Cell Management	OTS	HAL DCE Cell Manager
MSS	MCI	Security Management Proxy	DEV	
MSS	MCI	Accountability Manager	DEV	
MSS	MCI	User Profile Server	DEV	
MSS	MCI	Management Proxy	DEV	
MSS	MCI	Physical Configuration Manager	OTS	Mountain View
MSS	MCI	Network Manager	OTS	HP OpenView Network Node Manager
MSS	MCI	Physical Configuration Proxy Agent	DEV	
MSS	MCI	Trouble Ticketing Management Services	OTS	Remedy Action Request System
MSS	MCI	Trouble Ticketing User Interface	DEV	
MSS	MCI	Trouble Ticketing Service Requester	DEV	
MSS	MCI	Trouble Ticketing Proxy Agent	DEV	
MSS	MCI	Management Data Access Services	DEV	
MSS	MCI	Management Data Access User Interface	DEV	
MSS	MCI	Ground Events Planning	reuse	reused from Planning Subsystem, PLANG CSCI ,planning workbench CSC
MSS	MLCI	Baseline Manager	OTS/ DEV	Not chosen yet
MSS	MLCI	Software Change Manager	OTS/ DEV	ClearCase
MSS	MLCI	Change Request Manager	OTS/ DEV	Distributed Defect Tracking System
MSS	MACI	Extensible SNMP Master Agent	OTS/ DEV	Peer Network's agent, along with its toolkit for DEV
MSS	MACI	ECS Subagent	DEV	
MSS	MACI	DCE Proxy Agent	DEV	
MSS	MACI	Encapsulator for non-Peer Agent	OTS/ DEV	non-Peer agents not chosen yet, thus encapsulation not chosen yet.
MSS	MACI	SNMP Manager's Deputy	DEV	
MSS	MACI	Instrumentation Class Library	DEV	
MSS	MACI	Application MIB	DEV	

## 3.4 DAAC Hardware and Network Design

This section provides an overview of the hardware configuration currently envisioned to support the Release A TRMM mission for SMC. Included below are details with respect to the Release A network architecture (within Section 3.4.1) and the hardware (within Section 3.4.2).

### 3.4.1 SMC Network Architecture

The SMC network architecture, as illustrated in Figure 3.4.1-1, consists of two FDDI LANs. The Enterprise Communications Server and the Enterprise Management Server connect directly to one of the FDDI rings, and the Management Workstations and printers are attached to Ethernet networks bridged to the FDDI ring via an Ethernet-to-FDDI hub. Since the Bulletin Board Server (BBS) is accessible by the general public, it is attached to a separate FDDI ring to facilitate increased security and to segregate BBS traffic from the rest of the SMC. The specific implementation of the SMC interface to external systems is currently TBD due to the EBnet consolidation (see Section 5.1.1 of Volume 0), so the exact topology of the "Router/FDDI Switch" is not yet resolved. Note that this only impacts the method by which the router connects to external systems; it does not impact the internal SMC LAN architecture.



**Figure 3.4.1-1. SMC Network Architecture**

Because the SMC has been assigned requirements dictating very high availability, the FDDI LANs will be implemented via physically wired rings as opposed to concentrators. Physical rings eliminate concentrator hardware from the network and create a less complex topology, thereby increasing availability. The use of physical rings is feasible in this case due to the very small number of hosts on the FDDI network (two hosts on one ring and one host on the other). Of course, the workstations and printer will be attached to the Ethernet-to-FDDI hub, which will in turn be part of the physically wired FDDI ring.

The quantities of networking hardware components for the SMC is presented in Table 3.4.1-1. Specific vendor information and selection rationale is presented in Section 5.3 of 305-CD-004-001. Note that the FDDI switch vendor selection is currently under evaluation.

**Table 3.4.1-1. Networking Hardware for SMC LAN**

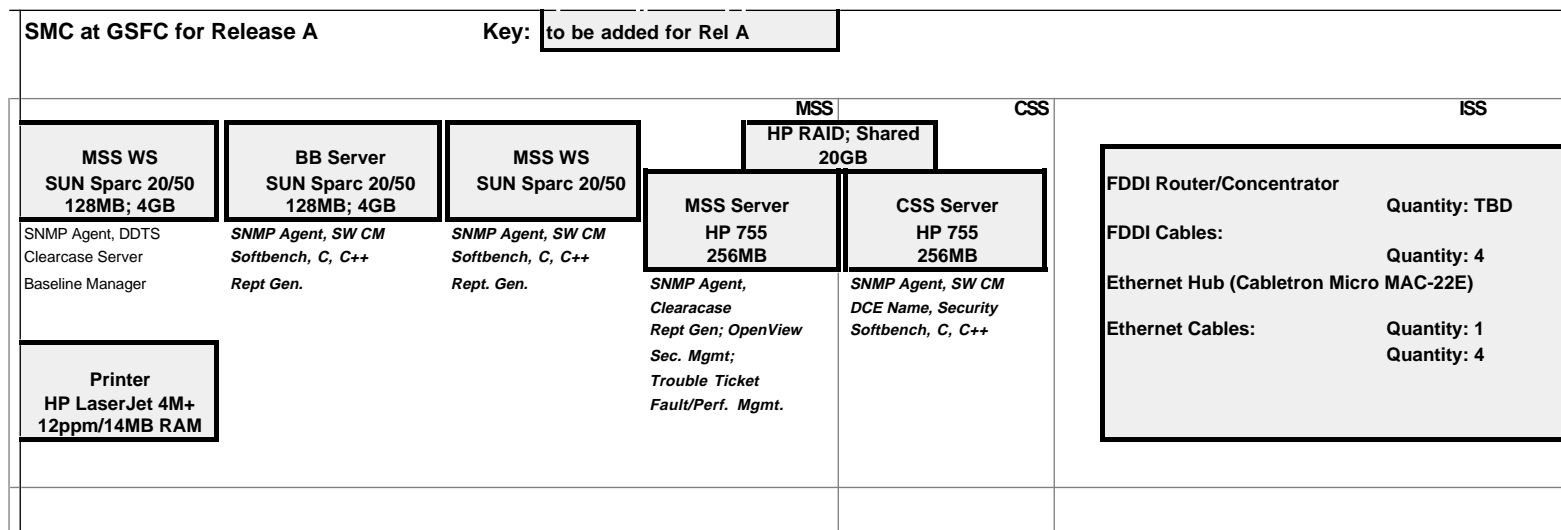
<b>Networking Component</b>	<b>Quantity</b>	<b>Comments</b>
FDDI Cables	6	Multimode fiber cables with MIC connectors
FDDI-to-Ethernet Hub	1	Connects printers and workstations
Ethernet Cables	4	10baseT connection to printers
Router/FDDI Switch	TBD	May be provided by external system - TBD

### **3.4.1.1 Sizing/Performance Rationale**

Although the total network traffic appearing on the networks to which SMC servers are attached is fairly low (e.g., less than 1 Mbps peak), an FDDI network was chosen for a variety of reasons, one of which was the fact that network loads would increase in Release B. A major advantage in using FDDI is its inherent redundancy: If any portion of the FDDI ring is severed or damaged, the wiring will automatically reconfigure itself to "heal" around the failure, enabling full and uninterrupted connectivity to continue. FDDI also provides sparing advantages both for the SMC hosts (in terms of the availability of FDDI replacement hardware) and for the Router (in terms of it possibly being implemented via the same hardware as is chosen for the DAAC FDDI switches).

### **3.4.2 SMC Hardware Configuration**

The SMC hardware configuration, as illustrated in Figure 3.4.2-1, SMC Hardware Configuration Diagram, is by and large identical to the MSS and CSS subsystem designs for the LSM at each DAAC, with the exception of the bulletin board server which resides only at the SMC. The remainder of this section provides the detailed hardware design and rationale for the MSS and CSS subsystems for Release A.



**Figure 3.4.2-1, SMC Hardware Configuration Diagram**

### 3.4.2.1 MSS and CSS Subsystems

The MSS and CSS Subsystem hardware have been sized and configured in a redundant configuration in order to provide for high availability of communications infrastructure and management services. The sizing rationale, therefore, applies to both MSS and CSS servers and will be presented in a single subsection.

The MSS Subsystem consists of a single hardware CI (MSS-HCI), which provides the servers, workstations, and printers needed for all local system management functions. The MSS-HCI provides processing and storage for the following MSS software components:

- Management Software CI (MCI) - provides system monitoring and control (via HP Openview), the database management system (Sybase), trouble ticketing; and management data access (custom code / scripts used to import log file data to the RDBMS).
- Management Logistic CI (MLCI) - Site and SMC maintenance and operations staffs will rely on the Configuration Management Application Service (CMAS) to track ECS baselines; manage system changes; store ECS source code, binaries, test data and documentation; and provide resource version and status information.
- Management Agent CI (MACI) - Agents are processes used to monitor and/or control managed objects distributed across heterogeneous platforms. Current COTS technology for network management uses network protocols such as SNMP to provide a way for the manager, the managed objects, and their agents to communicate. SNMP defines specific messages, referred to as commands, responses, and notifications.

The CSS Subsystem consists of a single hardware CI (CSS-DCHCI), which provides the server for all CSS functionality. CSS contains a single CI, the Distributed Communications CI, which provides the following services:

- Common Facility Services - includes electronic mail, file access, bulletin board, virtual terminal, and event logger services
- Object Services - includes security, naming, message passing, event, thread, time and lifecycle services
- Distributed Object Framework - includes OODCE framework functionality

#### 3.4.2.1.1 Sizing Rationale

The MSS/CSS processing and storage complement for the SMC was designed and sized for the TRMM missions, based on the 6/21/95 version of the technical baseline.

**Processing**—Processing requirements for the MSS and CSS subsystem at the SMC are primarily driven by the following types of transactions:

- DBMS usage for report generation / ad hoc queries
- Usage for configuration management, baseline management, trouble-ticketing, and associated report generation

- DCE logical server transactions (directory, security, time)

HP Openview will be used at the SMC primarily to collect data about the SMC's managed objects (i.e., the servers, workstations, peripherals, bulletin board, and FDDI concentrators). HP Openview monitoring of the DAAC-to-DAAC WAN is not expected to be required, based on the Ebnet consolidation, and the interface between Ebnet and the SMC. The SMC will still need to collect data from Ebnet regarding faults and performance associated with the WAN, but this interface is not yet defined.

**Server Sizing**—At Release A, only ad-hoc queries and reports will be generated from the Sybase database, which will be relatively small at the DAACs. However, the SMC may wish to do analysis across DAACs, and may wish to analyze months of DAAC-produced data at a time. Since there are no performance requirements on specific types of operator queries, nor specific guidance on the amount of data the SMC may wish to analyze for various uses, it is difficult to provide a precise analysis of the processing power required to support them. However, initial benchmarking in the EDF provides some guidance regarding the processing requirements at Release A.

DBMS performance estimates proved in the "DBMS Benchmark Report" technical paper (430-TP-003-001), show that for multi-user (32 users) queries (20 similar queries accessing different parts of the test database) running concurrently, the test-bed CPU, a SUN SPARCstation 20/50, rated at 133 MIPS, became saturated. At Release A, although multiple sessions are possible, it is reasonable to think that fewer than 5 queries will be run simultaneously, and therefore that the processing requirement will be significantly less than the capacity of the SUN tested. Additional Sybase performance benchmarks will be run as Release B reporting requirements are defined in order to better analyze server / workstation capacity needs.

DCE has been installed in the EDF and used in the Engineering Prototypes (EPs). Running on an HP 715, rated at 77 MIPS, the DCE server functions used 8% of the CPU, or approximately 6 MIPS. An analysis was performed to determine how much additional load would be placed on the DCE server at Release A and B.

Load imposed on the DCE server is a function of the number of directory, security and time look-ups from client applications. A client application maintains its own cache containing the most recently accessed directory and security information, and will only access the server when a user is not found in its own cache. The client cache is sized at 512 KB or 1/2 percent of the client memory, whichever is greater. This enables storage of approximately 425 directory and security records (a directory record is 1000 bytes; a security record is 200 bytes) at each client. Many client applications will only access other clients within the DAAC, and so will never exceed their cache. CIDM and the Data Server APC, however, will be directly accessed by external user clients and so will need to access directory and security information for each user access. At Release A, given the user baseline of 448 total ECS users, it is unlikely that any client at a single DAAC will exceed its cache storage; therefore, after the initial access for each client, the server may not be accessed again for directory and security information, unless re-initialization occurs.

ECS already has experience with many of the COTS products to be loaded on the MSS server from previous work in Evaluation Prototypes (EPs) and EDF installations. Based on this experience, a profile of the MSS/CSS server that is operating under nominal load (e.g., HP Openview map is displayed, but no collections are in process) has been developed.

In the EDF, an HP 9000/735/125 (rated at 154 MIPS), equipped with 213 MB RAM was loaded with HP Openview, DCE client, Sybase server, X-server, and operating system. Tests were run to examine the impact of various types of HP Openview functions on CPU utilization. HP Openview was configured to discover approximately 500 nodes within EDF and then displayed them as a node map. Minimal status polling was performed at 15 minute intervals. A variety of HP Openview on-line reports were generated to show such items as packet throughput and CPU utilization. During the testing, processes resident on the server were monitored. CPU utilization remained extremely low (i.e., less than 3%) except during operator queries and initialization. At system start-up, initialization of the various daemons used by HP Openview generated a load of approximately 50%. After start-up, functions that involved initialization of x-windows screens (e.g., generation of the node map or display of a performance graph) generated loads of 25-40% for a brief (less than 15 seconds) period of time. Multiple SNMP queries on a router increased cpu usage to approximately 20 percent, with the primary driver appearing to be the x-windows server. Simultaneous queries of two routers (to two different x-window screens) consumed a total of 50-60% of the cpu. Based on this benchmark, we assume that a basic configuration of a server, including HP Openview, Sybase (inactive), DCE client, and the operating system will require approximately 72 MIPS, and will provide more than adequate resources for routine HP Openview operations at the SMC.

The server requirements, as dictated by the rationale given above, is synopsized in Table 3.4.2.1.1-1.

**Table 3.4.2.1.1-1. CSS/MSS Server Configuration - Requirements Estimate**

Server Load Sources	Estimated R-A MIPS
Basic configuration (includes HP Openview and DCE client)*	72
Sybase Server and Client*	50
Remedy*	30
MSS Agent*	3
DCE server (including additional processing for peak directory and security transactions)*	6
Word Processor	1
Spreadsheet	1
Mail User Interface	3
Other Common Services (Mail, file transfer, etc)*	5
Operating System*	6
Total (Items with an asterisk were considered to be potentially active at the same time. MDA database update is assumed to be run in off-peak hours, and not concurrently with Sybase report generation functions.)	167

**Workstation Sizing**— the MSS workstation, the biggest drivers will be the MLCI software COTS, including Clearcase, the Software Change Manager, the Inventory Change Manager, and the Baseline Control Manager. In addition, the MSS Workstation will contain the Sybase client, DCE client, MSS agent, and operator tools. Although the CM database will be much larger at the DAACs, it is expected to be more stable than in a development environment, requiring fewer updates and fewer extractions. In the EDF, Clearcase was installed on a SPARCstation 10, equipped with 120 MB RAM, rated at 109 MIPS, and with an ethernet interface. The SPARCstation 10 was initially used for Toolkit development, as well as CM of the Evaluation Prototypes. With moderate numbers of users, the SPARCstation 10 provided good performance. At peak use (15-20 simultaneous users viewing items, manipulating the contents of the database, and executing directly out of Clearcase), performance was adversely affected. Usage at the DAAC is not anticipated to require more than 5 simultaneous users, frequency of use is anticipated to be much lower, and applications will not be executed from with the Clearcase tool. Although additional benchmarking or analysis will help determine the precise Clearcase processing requirements at the DAAC, EDF experience suggests that a workstation configuration in the SPARCstation 20 range should be adequate to support Clearcase, other MLCI COTS, and DCE and Sybase clients.

Table 3.4.2.1.1-2 below reflects a best estimate of load to be imposed on the MSS workstation at Release A. It assumes that most functions run concurrently. Since two workstations are planned to support MSS functionality at Release A, and additional workstation(s) at Release B, operator functions can be spread across workstations in such a way as to minimize load.

**Table 3.4.2.1.1-2. MSS Workstation Configuration - Requirements**

Workstation Load Sources	Estimated, R-A and R-B MIPS
Basic configuration (includes Clearcase and Operating System)*	50
Inventory Manager, Change Request Manager, Baseline Manager*	20
Sybase Client*	10
Word Processor	1
Spreadsheet	2
Graphics	1
MSS Agent*	2
DCE Client*	5
Other Common Services (Mail, file transfer, etc)	5
Total (Items with an asterisk were considered to be potentially active at the same time)	87

**Bulletin Board Sizing**—The processing requirements for the bulletin board server, which will be primarily used as an HTML server for general ECS users, are driven by the number of simultaneous user accesses. Based on existing bulletin boards, news servers, and web servers in use by ECS, ESDIS, and V0, a workstation will adequately provide for bulletin board requirements. At GSFC, the ESDIS bulletin board (maintained by the V0 network engineer) was initially maintained on a SUN SPARCstation 10 with 48 MB RAM and 1 GB disk space. Over a 4 day period, an average of 1,950 accesses a day were recorded, with minimal impact on the bulletin board server, which provides support for anonymous ftp, gopher, and web accesses to EOS-related information. Based on this, a SUN SPARCstation20 with 128 MB RAM and 4 GB disk should be adequate, even through Release B. Additional storage can be added if required.

**Storage Requirements** Major datastores for the MSS and CSS subsystems include: HP Openview files, application log files, the Management DBMS, and Clearcase-managed data. Other significant datastores include DCE directory and security data, mail, trouble ticketing

database, inventory management database, baseline control database, and software change database.

The size of the data storage for HP Openview has been estimated from the determination of the frequency of transmission of the necessary information of all the appropriate attributes of the managed objects during one hour period. It was assumed that fourteen days worth of HP Openview data are stored.

The SMC will, in general, receive summary data from each of the sites, and will not store the entire DBMS for a particular site. However, in specific instances, the SMC may wish to perform detailed analyses that involve cross-correlation from sites. The storage requirement for the Management DBMS was based on a worst case assumption that the SMC stores one entire month's data from each of the Release A (operational) sites.

Storage requirements for Clearcase are based on the assumption that Clearcase will store, at Release A, two copies of all source code (including ECS application source and algorithms from each site) and two copies of ECS executables. This will enable recovery of the previous version of any application if required. In addition, Clearcase will store test data and configuration files.

The total storage requirement for Release A is estimated to be between 8 and 10 GB (including an allowance for Sybase swap space).

**Table 3.4.2.1.1-3. SMC MSS Release A Storage Requirements**

<b>Datastore</b>	<b>Freq of Events/Hr</b>	<b>Size in Bytes/ Transaction</b>	<b>Size in Bytes Transmitted/Hr</b>	<b>Storage Requirements MBytes</b>
<b>HP Openview Datastore</b>	6942	4	33,798	11
<b>Sybase DBMS</b>				924
<b>Clearcase</b>				3,507
<b>Other COTS and product executables</b>				3,128
<b>Total Storage Requirement</b>				<b>7,570</b>

**Table 3.4.2.1.1-4. SMC CSS Release A Storage Requirements**

CSS Data Store	# of Users	Size of Record (# Bytes)	Storage Requirements MBytes
Directory	448	1000	0.4
Security	448	200	0.1
Mail (per day)	150		0.6
Total Storage Requirement			1

**Processor Selection**—Choice of the MSS/CSS Server platform was based on Release A processing requirements, COTS to be hosted on the platform, and price/performance data provided by EDS. HP is the preferred vendor, since HP Openview and OODCE will be principal COTS products on these platforms, and HP is one of the principal developers of DCE and OODCE. Workstations throughout the DAACs and SMCs are Sun SPARCs, with specific configurations varying by subsystem and DAAC.

#### **3.4.2.8.2 Configuration**

The SMC will contain two primary servers for its configuration, cross-strapped to RAID disk to enable warm backup. MSS and CSS applications will run on separate processors but in case of contingency, either system will be capable of running both subsystems. In addition, two workstations will be provided for operations and data analysis. A bulletin board server will provide support for general user access to ECS-related data and registration activities.

The following configuration will be provided for the SMC, which includes the MSS HWCI and the DCHWCI.

- MSS Local Management Server and CSS Communications Server: 2 HP 9000s755/125 processors, rated at 213 MIPS, 256 MB of RAM
- RAID Storage: 10 GB storage x 2 RAID partitions for 20 GB total
- Workstations: 2 Sun Sparc 20/50 workstations...
  - 1 Sun Sparc 20/50 with 130 MIPS, 128 MB of RAM and 4 GB of storage (This workstation will house configuration management software)
  - 1 Sun Sparc 20/50 with 130 MIPS, 64 MB of RAM and 2 GB of storage
  - 1 HP Laser Jet 4M+ Printer, 12 ppm/14 MB
- Bulletin Board Server:
  - 1 Sun Sparc 20/50 with 130 MIPS, 128 MB of RAM and 4 GB of storage (This workstation will house configuration management software)

The SMC will contain two primary servers for its configuration, cross-strapped to RAID disk to enable warm backup. MSS and CSS applications will run on separate processors but in case of contingency, either system will be capable of running both subsystems.

### 3.5 Software/Hardware Mapping

Table 3.5-1 provides a mapping of SMC Release A software components to hardware. See note at bottom of table for mapping of HWCI units to the numbers identified in the table.

**Table 3.5-1. SMC Software to Hardware Mapping (1 of 2)**

Subsystem	CSCI	CSC	HWCI /units	NOTES
Client	WKBCH	CSMS Toolkit CSC	none	
CSS	DCCI	Multicast	none	At EOC(FOS) for Release A , neither at DAACs nor SMC for Release A
CSS	DCCI	File Access Services	29	
CSS	DCCI	Message Passing Services	29	
CSS	DCCI	Time Services	29	
CSS	DCCI	Event Logger Services	29	
CSS	DCCI	Electronic Mail Services	29	
CSS	DCCI	Thread Services	29	
CSS	DCCI	Directory/Naming Services	28	
CSS	DCCI	Life Cycle Services	29	
CSS	DCCI	Security Services	28	
CSS	DCCI	DOF Services	28	
CSS	DCCI	Virtual Terminal Services	28	
CSS	DCCI	Bulletin Board Services	SMC-specific HWCI	
ISS	INCI	Datalink/Physical		
MSS	MCI	Management Framework	26 or 27	
MSS	MCI	Diagnostic Tests	26 or 27	
MSS	MCI	Application Management	26 or 27	
MSS	MCI	Automatic Actions	26 or 27	
MSS	MCI	Resource Class Category	26 or 27	
MSS	MCI	Performance Manager	27,28	
MSS	MCI	Report Generation and Distribution	27,28	
MSS	MCI	Performance Test	26 or 27	
MSS	MCI	Performance Management Proxy	26 or 27	
MSS	MCI	Security Manager	26 or 27	

**Table 3.5-1. SMC Software to Hardware Mapping (2 of 2)**

MSS	MCI	Security Databases	26 or 27	
MSS	MCI	Tests	26 or 27	
MSS	MCI	DCE Cell Management	26 or 27	
MSS	MCI	Security Management Proxy	26 or 27	
MSS	MCI	Accountability Manager	27,28	
MSS	MCI	User Profile Server	26 or 27	
MSS	MCI	Management Proxy	26 or 27	
MSS	MCI	Physical Configuration Manager	27, 28	
MSS	MCI	Network Manager	27, 28	
MSS	MCI	Physical Configuration Proxy Agent	27, 28	
MSS	MCI	Trouble Ticketing Management Services	27,28	
MSS	MCI	Trouble Ticketing User Interface	27,28	
MSS	MCI	Trouble Ticketing Service Requester	26 or 27	
MSS	MCI	Trouble Ticketing Proxy Agent	27,28	
MSS	MCI	Management Data Access Services	26 or 27	
MSS	MCI	Management Data Access User Interface	26 or 27	
MSS	MCI	Ground Events Planning	26 or 27	
MSS	MLCI	Baseline Manager	26 or 27	
MSS	MLCI	Software Change Manager	26 or 27	
MSS	MLCI	Change Request Manager	26 or 27	
MSS	MACI	Extensible SNMP Master Agent	26 or 27	
MSS	MACI	ECS Subagent		
MSS	MACI	DCE Proxy Agent		
MSS	MACI	Encapsulator for non-Peer Agent		
MSS	MACI	SNMP Manager's Deputy		
MSS	MACI	Instrumentation Class Library		
MSS	MACI	Application MIB		

Note: Units mapping

1== SPRHW/science processors

2==SPRHW/queuing management server

4==AITHW/AI&T DBMS server

5==AITHW/AI&T Operations workstations

7==AQAHW/QA workstations

8==PLNHW/planning server  
9==PLNHW/planning workstations  
10==ICLHW/ingest server  
11==ICLHW/ingest workstation  
12==ACMHW/administration and operations workstations  
13==ACMHW/APC servers  
14==DIPHW/distribution servers  
17==DRPHW/FSMS servers  
18==DRPHW/archive robotics  
19==DRPHW/DBMS servers  
20==DRPHW/document server  
22==DMGHW/data specialist workstations  
23==DMGHW/administration and operations workstations  
24==DMGHW/DBMS servers  
26==MSS/MSS workstations  
27==MSS/MSS Local System Management server  
28==CSS/CSS server  
29== all workstations and hosts  
30== User workstation

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## 4. Future Releases

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This document has described the design of ECS subsystems for the SMC at Release A of ECS. Three other releases are currently being planned. The next release, Release B is scheduled for deployment in September 1997. There will be a significant increase in functionality with Release B, as identified in the Release Plan Content Description document. The impact of the new capabilities offered by Release B on the SMC will be considerable. Release B will be the first to bring together all nine DAACs and additional system management functionality. As the system design progresses the precise nature of the impact on the SMC will be better understood.

An updated version of this document will be generated for Release B and will reflect the design corresponding to that release. In particular, items which will be reflected include:

- Accounting and billing services

- Monitoring and coordination of nine DAACs versus four at Release A

- Additional interfaces

- Support for FOS

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# Abbreviations and Acronyms

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ACMHW	Access Control and Management HWCI
ADC	Affiliated Data Center
ADS	Archive data sets
ADSHW	Advertising Service HWCI
ADSRV	Advertising Service CSCI
AITHW	Algorithm Integration & Test HWCI
AITTL	Algorithm Integration and Test Tools (CSCI)
AM	Ante meridian
ANSI	American National Standards Institute
APC	Access/Process Coordinators
API	Application Programming Interface
APID	Application Process Identifier
AQAHW	Algorithm QA HWCI
ASAP	As soon as possible
ASCII	American Standard Code for Information Interchange
ASF	Alaska SAR Facility (DAAC)
ATM	Asynchronous Transfer Mode
CCSDS	Consultative Committee for Space Data Systems
CD ROM	Compact disk read only memory
CDRL	Contract Data Requirements List
CERES	Clouds and Earth's Radiant Energy System
CI	Configuration Item
CIESIN	Consortium for International Earth Science Information Network
CLS	Client Subsystem
COTS	Commercial off-the-shelf
CPU	Central processing unit
CSC	Computer Software Component
CSCI	Computer Software Configuration Item

CM	Configuration Management
CSDT	Computer Science Data Types
CSMS	Communications and Systems Management Segment
CSS	Communication Subsystem (CSMS)
DAA	DAN Acknowledge
DAAC	Distributed Active Archive Center
DADS	Data Archive and Distribution System
DAN	Data Availability Notice
DAO	Data Assimilation Office
DAR	Data Acquisition Request
DAS	Data Availability Schedule
DBA	Database administrator
DBMS	Database Management System
DDA	Data Delivery Acknowledgement
DDICT	Data Dictionary CSCI
DDIST	Data Distribution CSCI
DDN	Data Delivery Notice
DDSRV	Document Data Server CSCI
DESKT	Desktop CI
DEV	Developed code
DID	Data Item Description
DIM	Distributed Information Manager
DIMGR	Distributed Information Management CSCI
DIPHW	Distribution & Ingest Peripheral Management HWCI
DMGHW	Data Management HWCI
DMS	Data Management System
DMS	Data Management Subsystem
DOF	Distributed Object Framework
DP	Data Processing
DPR	December Progress Review
DPREP	Science Data Pre-Processing CSCI

DPS	Data Processing Subsystem
DR	Data Repository
DRPHW	Data Repository HWCI
DS	Data Server
DSM	Distribution Storage Management
DSS	Data Server Subsystem
DT	Data Type
ECS	EOSDIS Core System
EDC	EROS Data Center (DAAC)
EDOS	EOS Data and Operations System
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
EP	Evaluation Package
EP	Early Prototype
ESDIS	Earth Science Data and Information System
ESDT	Earth Science Data Types
F&PRS	Functional and Performance Requirements Specification
FC	Fiber Channel
FDDI	Fiber distributed data interface
FDF	Flight Dynamics Facility
FOS	Flight Operations Segment
FSMS	File and Storage Management System
FTP	File transfer protocol
GB	Gigabyte
GDAO	GSFC Data Assimilation Office
GFLOPS	Giga (billions) Floating Point Operations per Second
GOES	Geostationary Operational Environmental Satellite
GRIB	Gridded Binary
GSFC	Goddard Space Flight Center
GTWAY	Version 0 Interoperability Gateway CSCI
GUI	Graphic user interface

HDF	Hierarchical Data Format
HiPPI	High Performance Parallel Interface
HMI	Human machine interface
HTML	Hypertext Markup Language
HWCI	Hardware Configuration Item
I&T	Integration and Test
I/O	Input/Output
IAS	Image Assessment System
ICD	Interface Control Document
ICLHW	Ingest Client HWCI
IDL	Interface Definition Language
IEEE	Institute of Electrical and Electronics Engineers
IERS	International Earth Rotation Service
IGS	International Ground Station
IP	International Partner
IR-1	Interim Release 1
IRD	Interface Requirements Document
IS	Ingest Subsystem
JPL	Jet Propulsion Laboratories
LaRC	Langley Research Center
LIM	Local Information Manager
LIMGR	Local Information Management CSCI
LIS	Lightning Imaging Sensor
L0	Level 0
LSM	Local System Management
MB	Megabyte
Mbps	Megabits per second
MBps	Megabytes per second
MD	Maryland
MFLOP	Millions of Floating Point Operations per Second
MOC	Mission Operations Center

MODIS	Moderate-Resolution Imaging Spectrometer
MPP	Massively Parallel Processor
MRF	Medium Range Forecast
MSFC	Marshall Space Flight Center
MSS	Management Subsystem (CSMS)
MTBF	Mean time between failures
MTTR	Mean time to restore
NESDIS	National Environmental Satellite Data and Information Service
NMC	National Meteorological Center
NOAA	National Oceanic and Atmospheric Administration
NSIDC	National Snow and Ice Data Center (DAAC)
O/A	Orbit/Attitude
ODC	Other Data Center
ODL	Object Description Language
ORNL	Oak Ridge National Laboratory (DAAC)
OSM	Open Storage Manager
OTS	Off-the-shelf
PAM	Permanent Archive Manager
PCI	Peripheral Component Interface
PDPS	Planning and Data Processing System
PDR	Preliminary Design Review
PDS	Production Data Set
PDS	Production Data Specialist
PGE	Product Generation Executive
PGS	Product Generation System
PLNHW	Planning HWCI
POSIX	Portable Operating System for UNIX
PRONG	Processing CSCI
Q	Quarter
Q/A	Quality Assurance
QA	Quality Assurance

QAC	Quality and Accounting Capsule
RAID	Redundant Array of Inexpensive Disks
RAM	Random Access Memory
REL	Release
RID	Review Item Discrepancy
RMA	Reliability, Maintainability, Availability
RTF	Rich Text Format
S/C	Spacecraft
SAA	Satellite Active Archives (NOAA)
SCF	Science Computing Facility
SCSI II	Small Computer System Interface
SDF	Software Development File
SDP	Science Data Processing
SDPF	Sensor Data Processing Facility (GSFC)
SDPS	Science Data Processing Segment
SDPS/W	Science Data Processing Software
SDPTK	SDP Toolkit CSCI
SDSRV	Science Data Server CSCI
SFDU	Standard Format Data Unit
SMC	System Monitoring and Coordination Center
SMP	Symmetric Multi-Processor
SPRHW	Science Processing HWCI
STMGT	Storage Management CSCI
TBD	To be determined
TBR	To be resolved
TDRSS	Tracking and Data Relay Satellite System
TONS	TDRSS Onboard Navigation System
TRMM	Tropical Rainfall Measuring Mission
TSDIS	TRMM Science Data and Information System
UR	Universal Reference
USNO	United States Naval Observatory

V0	Version 0
VC	Virtual Channel
VCDU-ID	Virtual Channel ID
WAIS	Wide Area Information Servers
WAN	Wide Area Network
WKBCH	Workbench CI
WKSHC	Working Storage HWCI
W/S	Workstation
WORM	Write Once Read Many
WS	Working Storage
WWW	World Wide Web